# ATEX – Questionnaire

**For information on completing the questionnaire, refer to page 4 and following.**

Customer: _____

Contact: _____

Phone: _____

E-Mail: _____

Project / Machine: _____

**1. Is there an explosive atmosphere?** ☐ **Yes** ☐ **No** (no further information required)

**2. Process description / process parameters**

| Please describe in short words! |
| --- |
| |

## 3. Substance data

| **3.1 Gases / vapours / mists** ☐ No ☐ Yes | **3.2 Dusts** ☐ **No** ☐ **Yes** |
|---|---|
| Substances used: | Substances used: |
| Ignition temperature: °C | Ignition temperature: °C |
| Ignition group: ☐ IIA ☐IIB ☐IIC | Smouldering temperature: ° C |
| | Minimum ignition energy (MIE): |
| | Ignition group: ☐ IIIA ☐ IIIB ☐ IIIC |
| | Dust explosion class: ☐ St1 ☐ St2 ☐ ST3 |

## 4. Calculation of the maximum surface temperature

- performed by Lödige

## 5. Will foreign bodies / smoulder spots, as an ignition source, be impossible?

☐ **No** ☐ **Yes**

| If no, please explain counter-measures! |
|---|

## 6. Measures for avoiding an explosive atmosphere, e.g. inerting

☐ **No** ☐ **Yes**

| |
|---|

## 7. Will structural explosion protection be provided, e.g. pressure resistant design? ☐ **No** ☐ **Yes**

| |
|---|

## 8. Zone determination (frequency of occurrence of an explosive atmosphere)

| | | |
|---|---|---|
| In the mixer/ rector | ☐ Zone 0 ☐ Zone 1<br>☐ Zone 2 ☐ No Zone | ☐ Zone 20 ☐ Zone 21<br>☐ Zone 22 ☐ none |
| Outside the mixer/ reactor | ☐ Zone 0 ☐ Zone 1<br>☐ Zone 2 ☐ No Zone | ☐ Zone 20 ☐ Zone 21<br>☐ Zone 22 ☐ No Zone |
| | | Dust layers/accumulations shall be avoided by organisational measures.<br>☐ Yes ☐ No |

## 8.1 Additional information on zoning (surroundings, affected devices, etc.)

☐ Drawing / sketch enclosed
Remark:

## 9. Ambient temperatures:

The machine(s) is/are designed for a temperature range between +5°C and +30°C. If this temperature range is insufficient for your requirements, please contact the Lödige sales employee responsible for you.

**Temperature range applicable** ☐ **No** ☐ **Yes**

Place / Date

Signature/ Stamp

Should you require any further information, please contact your sales representative directly.

## What is the purpose of these questions? Explanation of the questionnaire

Your information is absolutely required to accurately assess the risk of ignition. Without it, the machine cannot be designed as required.

The explanations below are numbered with the corresponding questionnaire number.

Please do not make reference to data sheets!

## 1. Is there an explosive atmosphere?

## 2. Process description / process parameters

⇨ These are required for the overall assessment of the explosion protection situation.

Please describe in keywords:

- How is the machine filled or loaded?
- At which temperature is the machine filled?
- What is the product temperature during filling?
- What is the humidity level of the products?
- What is the process temperature?
- Which other substances are added?
- Does inerting take place prior to the process? (I.e. the oxygen in the machine is displaced by introducing another non-explosive gas.)
- Is the process performed under vacuum or pressure?
- Is the machine interior heated or cooled during the process? To which temperatures? In which cycles?
- How is the machine cleaned? At which temperatures and under which conditions?

The temperature limits for the pre-alarm and shut-down of the machine are specified in the context of ignition source monitoring.
Ensure that these temperature limits do not conflict with the operating parameters!

## 3. Substance data

Please define the substances used by you.

### 3.1. Gases / vapours / mist

#### 3.1.1. Ignition temperature

⇨ It is required for determining the permissible surface temperature.

⇨ The ignition temperature is the temperature of a hot surface that causes the flammable mixture to ignite without an ignition spark. It is determined under prescribed test conditions.

#### 3.1.2. <u>Ignition groups for gases:</u>

⇨ The ignition risk of the gas increases from ignition group IIA to IIC.

There are 3 different ignition groups for gases:

| Group | Gas (example) |
|---|---|
| II A | Acetone, benzene, methane, propane |
| II B | Ethylene, hydrogen sulphide, coal gas |
| II C | Acetylene, carbon disulphide, hydrogen |

## 3.2. Dust

### 3.2.1. Ignition temperature

See section 3.1.1.

### 3.2.2. Smouldering temperature

- ⇨ It only occurs for dust.
- ⇨ The smouldering temperature is the lowest temperature of a hot surface at which a layer of dust of **5 mm** thickness on this surface ignites. It is determined under prescribed test conditions.
- ⇨ The smouldering temperature decreases as the thickness of the dust layer increases.

**Note 1:** If the smouldering temperature is not known, it can be determined in a suitable laboratory.

**Note 2:** The smouldering/auto-ignition temperature of a layer of dust is always lower than the ignition temperature of a dust cloud.

### 3.2.3. Minimum ignition energy (MIE) for dust

- ⇨ The MIE is the smallest electrical energy stored in a capacitor which when discharged is sufficient to ignite a flammable mixture.
- ⇨ **Caution:** The fluidised bed created in the mixture can cause a brush discharge. A brush discharge is sufficient to ignite an **extremely flammable** dust atmosphere. In this case, preventive or structural protection measures are necessary.
- ⇨ For **extremely flammable** dust atmospheres, consult an expert. See chart.
- ⇨ The humidity of the products must also be taken into account for this purpose.

There are 3 different classes of dust:

| Susceptibility | MIE [mJ] | Necessary explosion protection measures |
|---|---|---|
| Normal susceptibility to ignition | > 10 | Avoidance of effective ignition sources |
| Particularly susceptible to ignition | ≥ 3 ≤ 10 | Expert decision |
| Highly susceptible to ignition | < 3 | Avoidance of explosive atmospheres (preventive explosion protection) or avoidance of ignition sources through structural explosion protection measures |

**If no specifications are made with respect to the MIE, it will be assumed that the dust in the atmosphere has normal susceptibility to ignition (MIE > 10 mJ)!**

### 3.2.4. Conductive dust

There are 3 different ignition groups for dust:

| Group | |
|---|---|
| III A | Suitable for flammable suspended particles |
| III B | Suitable for flammable suspended particles and non-conductive dust |
| III C | Suitable for flammable suspended particles, non-conductive dust and conductive dust |

### 3.2.5. $K_{ST}$ value

⇨ This information is only required if explosion suppression systems are to be used.

There are three dust explosion classes:

ST 1: > 0 - 200 bar m/s
ST 2: 201 - 300 bar m/s
ST 3: > 300 bar m/s

## 4. Determination of the permissible surface temperature (conducted by Lödige)

## 5. Will foreign bodies / smoulder spots, as an ignition source, be impossible?

If foreign bodies or smoulder spots **cannot** be reliably excluded, it is necessary to

- take measures for avoiding an explosive atmosphere, e.g. inerting or
- keep the concentration of the explosive mixture lower than the lower explosive limit (LEL) or
- install measures for preventing the ingress of foreign bodies, e.g. using magnetic separators, screens etc., or
- take structural measures, e.g. pressure impact resistant design.

**These measures are to be implemented in the context of process management and are the responsibility of the owner/user.**

## 6. Are measures for preventing a potentially explosive atmosphere taken?

**Does, e.g. inerting take place** or is the concentration of the explosive mixture kept lower than the lower explosive limit or above the upper explosive limit (LEL/UEL)?
Is some other measure implemented to prevent a potentially explosive atmosphere?

⇨ If this is applicable, take these measures into account for zoning.
⇨ Please describe these measures.

## 7. Will structural explosion protection be provided?

Structural explosion protection is always provided, if explosions are possible during machine operation. The structural protection measures include:

- Design resistant to pressure blasts from explosions (the vessel may be deformed during an explosion however, it may not burst)
- Design resistant to pressure from explosions (the vessel may not be deformed during an explosion)
  - ⇨ **Note:** In both cases, additional measures for protecting machine line components may be required. This normally requires consultancy by companies specialising in explosion protection.
- Explosion pressure relief, e.g. the use of blow-out channels, bursting disks
- Explosion suppression, e.g. by fast distribution of extinguishing agents; extinguishing cartridges
- Explosion decoupling, e.g. by fast closing valves, rotary feeders, star feeders

Please describe any structural explosion protection measures taken.

## 8. Zoning

Which zone is defined is subject to how frequently an explosive atmosphere can occur.
The frequency of occurrence defines the zone and therefore the necessary equipment category.
Not merely the space in which the explosive atmosphere occurs, but also possible outlet openings through which the explosive atmosphere may spread must be taken into account for this purpose.

Consciously ask yourself the following questions:

1. Which units are in the potentially explosive area (drives, electrical consumers, switch cabinet, control point, etc.)?
2. Where might zones expand (e.g. on transfer points of the feeding and discharge system, extraction system, etc.)?
3. Where is a potentially explosive atmosphere to be expected outside the mixer?

Depending on the frequency of occurrence, the zones are defined as follows:

| **Gas (G)** | **Dust (D)** | Equipment category | Frequency of occurrence |
|---|---|---|---|
| Zone 0 | Zone 20 | 1 | An area in which a potentially explosive atmosphere is present constantly, for long periods or frequently. |
| Zone 1 | Zone 21 | 2 | An area in which an explosive atmosphere is likely to occur occasionally during normal operation. |
| Zone 2 | Zone 22 | 3 | An area in which an explosive atmosphere is not likely to occur during normal operation but, if it does occur, will persist for a short period only. |

## 9. Ambient temperatures

Based on the temperature restrictions of individual manufacturers, a temperature range between +5°C and +30°C is assumed. Should other temperature ranges be required, detailed consideration will be necessary.